

AGREEMENT FOR THE RENEWAL OF AN INTERNATIONAL ASSOCIATED LABORATORY (LIA)

“Sediment transport and landscape dynamics” LIA SALADYN

BETWEEN

The **CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE**, a public scientific and technological institution, with headquarters at 3, rue Michel-Ange 75794, Paris cedex 16, France, represented by Professor **Antoine PETIT**, Chairman and Chief Executive Officer hereinafter referred to as the CNRS

Given that **UNIVERSITÉ JEAN MONNET SAINT ETIENNE**, a public scientific, cultural and professional institution, with headquarters at 3, rue Maurice Audin, 69120 Vaulx-en-Velin, France, hereinafter referred to as “U. St-Etienne”, represented by Professor **Michèle COTTIER**, President, has given mandate to the CNRS to negotiate and sign this Amendment for the ***Environnement, Ville, Societe (EVS)***, *UMR5600*

Given that **INSTITUT DE PHYSIQUE DU GLOBE DE PARIS**, a public scientific, cultural and professional institution, with headquarters at 1, rue Jussieu, 75005 Paris, France, hereinafter referred to as “IPGP”, represented by Professor **Marc CHAUDISSON**, Director, has given mandate to the CNRS to negotiate and sign this Agreement for the ***Institut de physique du globe de Paris (UMR-IPGP)***, *UMR7154*

The **UNIVERSITÉ PARIS DIDEROT – PARIS 7**, a public scientific, cultural and professional institution, with headquarters at 5, rue Thomas-Mann 75013, Paris cedex 13, France, represented by Professor **Catherine CLERICI**, President hereinafter referred to as UPD

The **ÉCOLE NORMALE SUPÉRIEURE DE PARIS**, a public scientific, cultural and professional institution, with headquarters at 45, rue d’Ulm 75230, Paris cedex 05, France, represented by Professor **Marc MEZARD**, Director hereinafter referred to as ENS

The **UNIVERSITE RENNES 1**, a public scientific, cultural and professional institution, with headquarters at 2 rue du Thabor, CS 46510, 35065 Rennes cedex, France, represented by Professor **David ALIS**, Director hereinafter referred to as U.Rennes 1

The **ÉCOLE NORMALE SUPÉRIEURE DE LYON**, a public scientific, cultural and professional institution, with headquarters at 15, Parvis René Descartes, BP7000, 69342 Lyon, France, represented by Professor **Jean-François PINTON**, President hereinafter referred to as ENS Lyon

The **UNIVERSITÉ CLAUDE BERNARD LYON 1**, a public scientific, cultural and professional institution, with headquarters at Domaine scientifique de la Doua, 43, boulevard du 11 Novembre 1918, 69622 Villeurbanne cedex, France, represented by Professor **Frédéric FLEURY**, President

hereinafter referred to as UCLB

The **UNIVERSITÉ JEAN MOULIN LYON 3**, a public scientific, cultural and professional institution, with headquarters at 1 rue de l'Université, 69007 Lyon, France, represented by Professor **Jacques COMBY**, President

hereinafter referred to as U.Lyon 3

The **UNIVERSITÉ LUMIÈRE LYON 2**, a public scientific, cultural and professional institution, with headquarters at 86, rue Pasteur, 69635 Lyon cedex 07, France, represented by Professor **Nathalie DOMPNIER**, President

hereinafter referred to as U.Lyon 2

The **ÉCOLE NATIONALE DES TRAVAUX PUBLICS DE L'ÉTAT**, a public scientific, cultural and professional institution, with headquarters at 3, rue Maurice Audin, 69518 Vaulx-en-Velin cedex, France, represented by Professor **Jean-Baptiste LESORT**, President

hereinafter referred to as ENTPE

The **ÉCOLE NATIONALE SUPÉRIEURE D'ARCHITECTURE DE LYON**, a public scientific, cultural and professional institution, with headquarters at 3, rue Maurice Audin, 69120 Vaulx-en-Velin, France, represented by Professor **Nathalie MEZUREUX**, Director

hereinafter referred to as ENSA Lyon

The **INSTITUT NATIONAL DES SCIENCES APPLIQUÉES DE LYON**, a public scientific, cultural and professional institution, with headquarters at 20, avenue Albert Einstein, 69621 Villeurbanne, France, represented by Professor **Eric MAURINCOMME**, Director

hereinafter referred to as INSA Lyon

The **ÉCOLE NATIONALE SUPERIEURE DES MINES DE SAINT-ÉTIENNE**, a public scientific, cultural and professional institution, with headquarters at 158, Cours Fauriel, 42023 Saint-Étienne, France, represented by Professor **Pascal RAY**, Director

hereinafter referred to as MINES Saint-Étienne

CNRS, IPGP and UPD acting jointly in their own name and on behalf of the following laboratory:

- *Institut de physique du globe de Paris (UMR-IPGP), UMR7154*

CNRS and UPD acting jointly in their own name and on behalf of the following laboratory:

- *Laboratoire Matière et Systèmes Complexes (MSC), UMR7057*

CNRS and U.Rennes 1 acting jointly in their own name and on behalf of the following laboratory:

- *GEOSCIENCES RENNES, UMR6118*

CNRS and ENS Paris acting jointly in their own name and on behalf of the following laboratory:

- *Laboratoire de géologie de l'Ecole Normale Supérieure (LG-ENS), UMR8538*

CNRS, ENS Lyon and UCLB acting jointly in their own name and on behalf of the following laboratory:

- *Laboratoire de géologie de Lyon : Terre, planètes et environnement (LGL-TPE), UMR5276*

CNRS, ENS Lyon, U.Lyon 3, U.Lyon 2, MINES Saint-Étienne, INSA Lyon, ENSA Lyon, U. St-Etienne and ENTPE acting jointly in their own name and on behalf of the following laboratory:

- *Environnement, Ville, Société (EVS), UMR5600*

AND

The **XINJIANG INSTITUTE OF ECOLOGY AND GEOGRAPHY OF THE CHINESE ACADEMY OF SCIENCES**, a national institution, with headquarters at 818 South Beijing Road, Urumqi, Xinjiang, P.R. China, represented by Professor **CHEN Xi**, Director
hereinafter referred to as XIEG

The **PEKING UNIVERSITY**, a national university, with headquarters at No.5 Yiheyuan Road Haidian District, Beijing, P.R.China 100871, represented by Professor **LIN Jianhua**, President
hereinafter referred to as PKU

The **TIANJIN UNIVERSITY**, a national university, with headquarters at 92 Weijin Rd, Nankai Qu, Tianjin Shi, P.R. Chine, 300072, represented by Professor **LI Jiajun**, President
hereinafter referred to as TJU

The **INSTITUTE OF GEOLOGY, CHINA EARTHQUAKE ADMINISTRATION**, a national institution, with headquarters at Yard No.1, Hua Yan Li, Chaoyang District, Beijing, P.R. China, Professor **CHEN Jianmin**, President
hereinafter referred to as IGCEA

XIEG acting jointly in its own name and on behalf of the following laboratories:

- *Key Laboratory of Oasis Ecology and Desert Environment*
- *Bayanbulak research station for alpine steppe ecosystems*
- *National Engineering Technology Research Center for Desert-Oasis Ecological Construction*

PKU acting jointly in its own name and on behalf of the following laboratories:

- *School of Earth and Space Science*
- *College of Environmental Sciences and Engineering*

TJU acting jointly in its own name and on behalf of the following laboratory:

- *Institute of Surface-Earth System Science (ISESS)*

IGCEA acting jointly in its own name and on behalf of the following laboratory:

- *Institute of Geology*

Hereinafter referred to jointly as the “Parties” or individually as the “Party”.

CONSIDERING

The Scientific and Technical Agreement between the Government of the French Republic and the Government of the People's Republic of China signed in Beijing on January, 21, 1978.

The Agreement on cooperation between the Government of the French Republic and the Government of the People's Republic of China on intellectual property, signed in Beijing on September, 24, 1998.

Agreement for the creation of an International Associated Laboratory on Sediment Transport and Landscape Dynamics in Central Asia (LIA Saladyn), signed on 17 February 2014, (hereinafter referred to as the LIA Saladyn Agreement).

PREAMBLE

The LIA-SALADYN uniquely blends together multi-disciplinary expertise in landscape dynamics from France and China. This research network has a strong and evidential record in developing innovative field works as well as laboratory and numerical modelling techniques to understand the response of rock and sedimentary systems to different environmental drivers. Our common objective is to continue to lead the development of novel approaches to quantify feedbacks between topography, sediment transport and fluid flow in mountainous, desert, fluvial and coastal environments. This has been achieved so far through pioneering high resolution studies, where terrestrial laser scanning, satellite imagery and field measurements have been used for the first time to crucially link surface flows to dynamic patterns of erosion, deposition and transport in various tectonic settings. Yet, because all the Franco-Chinese emerging entities share the common theme of linking geophysical management and environmental issue, the principal aim of the scientific program is to positively encourages active collaboration between the soft walls that separate individual disciplines, namely geomorphology, sedimentology, tectonics, seismology and geochemistry.

The Parties now express for the second time their desire to renew this research collaboration under the terms of the present agreement (hereinafter referred to as the “Agreement”). For sake of clarity, this Agreement contains the recall of all the provisions now agreed rather than only the provisions amended considering the previous agreement. All provisions of the previous agreement signed in 2012 are replaced by the following:

CHAPTER I – CREATION, TERM, NAME, PURPOSE AND COMPOSITION

Article 1 – Renewal of the LIA SALADYN

By application of article 15 of the Original Agreement, the LIA is renewed for a further and last period of four (4) years, from January 1st 2017 until December 31st 2020.

Article 2 – Name

The LIA is called **Sediment transport and landscape dynamics**
Its abbreviation is “**LIA SALADYN**”.

Article 3 – Purpose

The purpose of the LIA's Agreement is to carry out the scientific program described in Annex 1 hereinafter “Scientific Program” which is an integral part of this Agreement.

Article 4 - Composition

The following laboratories and teams are involved in the LIA:

- *Institut de physique du globe de Paris (IPGP) - UMR7154*
- *Laboratoire Matière et Systèmes Complexes (MSC) - UMR7057*
- *Laboratoire de géologie de Lyon : Terre, planètes et environnement (LGL-TPE) - UMR5276*
- *Environnement, Ville, Société (EVS) - UMR5600*
- *Géosciences Rennes - UMR6118*
- *Laboratoire de géologie de l'Ecole Normale Supérieure (LG-ENS) - UMR8538*
- *Key Laboratory of Oasis Ecology and Desert Environment*
- *Bayanbulak research station for alpine steppe ecosystems*
- *National Engineering Technology Research Center for Desert-Oasis Ecological Construction*
- *School of Earth and Space Science*
- *College of Environmental Sciences and Engineering*
- *Institute of Surface--Earth System Science (ISESS)*
- *Institute of Geology*

Article 5 – Nature of the cooperation

The LIA is not a legal entity and has no legal capacity.

It is not the purpose nor effect of the Agreement, and nothing herein may be construed in this respect, to form, create, make effective or even acknowledge the creation of a joint venture, a mandate, a company, and interest group or any other commercial group or entity, or a de facto company between the Parties.

CHAPTER II - ORGANISATION OF THE LIA

Article 6 – Scientific coordinators

The LIA is coordinated by two (2) scientific coordinators. Scientific responsibility and management of the Program are assumed jointly by:

- Mr Clément NARTEAU, Institut de Physique du Globe de Paris
- Mr CHEN JiuBin, Université de Tianjin

Together they shall coordinate the LIA's Program, the provisional budget and the annual financial and scientific reports to be submitted to the Steering Committee.

Article 7 – Steering Committee

7.1 – Composition

A Steering Committee is established and composed of 8 members:

- 1 Representatives of the CNRS with entitlement to vote:
 - The Director of the Institute for Earth Sciences and Astronomy, or her/his representative.
- 1 Representatives of the IPGP with entitlement to vote:
 - The Director or her /his representative.
- 1 Representatives of the UPD with entitlement to vote:
 - The President or her/his representative.
- 1 Representatives of the UCBL with entitlement to vote:
 - The President or her /his representative.
- 1 Representatives of the Rennes 1 with entitlement to vote:
 - The President or her /his representative.
- 1 Representatives of the XIEG with entitlement to vote:
 - The Director or her /his representative.
- 1 Representatives of the PKU with entitlement to vote:
 - The President or her /his representative.
- 1 Representatives of the TJU with entitlement to vote:
 - The President or her/his representative.

Each representative may be assisted by any expert at meetings of the Steering Committee, subject to the signing of a non-disclosure agreement. These experts attend in an advisory capacity.

The scientific coordinators of the LIA attend Steering Committee meetings in an advisory capacity.

7.2. Chairman:

The Chairman of the Steering Committee is appointed by and among its members on a revolving basis at each meeting.

The Chairman shall report to the Parties on the results obtained and the use of the financial resources.

7.3. Meeting:

The Steering Committee meets at least once a year at the initiative of its Chairman or at the request of the Scientific Coordinators as often the interests of the LIA need it.

The decisions of the Steering Committee are adopted by a qualified majority of three quarters (3/4) of its member, present or represented; each Party being represented.

Should it be impossible to physically hold a Steering Committee meeting, decisions of the Steering Committee may be adopted by teleconferencing or by written consultation.

7.4. Role:

The Steering Committee shall:

- give an opinion on the progress, program and direction of research;
- decide as to the budgetary resources required for the LIA's activities;
- report to the Parties on results obtained and approve the use of the financial resources.

It may also study all others matters relating to the LIA.

CHAPTER III – FINANCIAL AND HUMAN RESOURCES

Article 8 – Financial provisions

Every year, the budget required to carry out the LIA Program shall be prepared by the two Scientific Coordinators and shall be submitted to the Steering Committee for approval. This budget includes stated requirements as well as the corresponding resources, detailed by the Parties funding them.

Annex 2, which is an integral part of the Agreement, summarises the provisional budget for the first year of the LIA, which detail, in particular, the Parties' contributions and the suggested use of the funds. It is updated every year by a decision from the Steering Committee.

Each Party allocates and manages the budgetary credits corresponding to its own funding.

As well as these financial resources, each Party manages, under its own responsibility and own authority, and according to its own rules, all the resources which it provides pursuant to the LIA: equipment, premises, facilities and staff.

Once a year, each Party shall justify to the other Parties, the resources actually allocated during the previous year (including equipment, premises and staff) in respect of the LIA. To this end, each Party draws-up a review of the financial resources allocated and their use (expenditure).

Use of the funding made by each scientific coordinator for the LIA program described in Annex 1 may be verified at the year-end following an ordinary request from an authorised representative of the other Party. The credits used by each scientific coordinator for the LIA are subject to the usual controls in the respective countries so as to verify their compliant use in accordance with the Agreement.

Article 9 – Staff

The staffs solicited by the scientific coordinators to contribute to the Program shall remain fully attached to their original organisation and carry out their work on the basis of instructions from their superiors. The scientific coordinators discuss on the terms and conditions, schedule and scope of the involvement of these employees in the implementation of the joint scientific program. Annex 3 summarises this involvement for the first year of existence of the LIA. The Parties shall be immediately informed of any changes and Annex 3 be updated.

Use of the infrastructures and/or equipment by the Parties' staff is subject to compliance with the health and safety rules established by the owner Party.

For the purposes of the LIA, the staff of a Party may have access to the other Parties' premises, subject to compliance with the by-laws of the Party controlling the premises and, possibly, to the signing of a hosting agreement.

Article 10 – Research contracts

The research contracts which the Parties wish to establish, within the framework of the LIA, with public or private, French or foreign third parties organisations are signed by all the Parties.

They are negotiated by one of the Parties designated by the Steering Committee. The authorised Party keeps the other Parties informed of the results of the negotiations. The latter

have fifteen (15) days to provide their opinion on the final draft. Subsequent to this period, opinion is deemed to be favourable.

Research contracts are managed by the Party which conducted negotiations. Nevertheless, the LIA's Steering Committee may wish another Party to manage one or more contracts. In this case, it shall inform each Party.

Non-disclosure clauses in these research contracts shall not prevent the relevant researchers from being entitled to mention their work in their activity report, which does not represent disclosure within the meaning of intellectual property legislation.

The contracts specifically provide that general support expenses are covered by the Party designated by the Steering Committee, for the activities which they enable to be developed. The relevant amounts, set after discussions between the Parties, are allocated to the budget of the Party designated by the Steering Committee for the corresponding amount.

For research contracts managed by the CNRS and including staff expenses, a deduction, representing a provision for redundancy, is made on the compensation, exclusive of taxes, but including social security and employer contributions.

Article 11 - Publications

Each Party undertakes to provide the other Parties with all the information required for carrying-out joint research work. Scientific results shall be published according to the usual custom and practice of the scientific community.

Publications related to the work carried-out in common within the framework of the LIA shall mention the connection with the Parties of the LIA. They shall include the words ***“Research conducted within the context of the International Associated Laboratory LIA SALADYN”***.

Any and all publication related to the work carried-out in common within the LIA shall be subject, during the term of this Agreement and for two years after its expiry date, to the agreement of the other Parties which shall notify their written decision within two months of receipt of the draft publication at the latest. Thereafter and in the absence of an objection, agreement shall be deemed to have been given.

Consequently, all draft publications are referred for the opinion of the other concerned Parties which may remove or change certain information, the disclosure of which could compromise industrial and commercial use, under optimum conditions, of the results of the work carried-out in common within the LIA. Such removals or changes shall not compromise the scientific value of the publication.

Article 12 – Confidentiality

The Parties undertake to ensure that the information exchanged pursuant to the LIA and identified as confidential (hereinafter referred to as the “Confidential Information”):

- a) is kept strictly confidential and is protected to the same extent as their own Confidential Information;
- b) is only provided to their members of staff requiring knowledge thereof and is only used in application of this Agreement, for four years as from its date of communication.

Any and all other communication or use of the Confidential Information is subject to the prior and written authorisation of the communicating Party. Each Party undertakes to ensure that its staff referred to in section b) hereinabove comply with the provisions of this Agreement.

These provisions shall remain in force for a period of five (5) years after the termination of the Agreement.

Notwithstanding the foregoing provisions, each Party may provide Confidential Information for which it is able to prove:

- that it was in the public domain prior to its communication or subsequent thereto, but without any breach being attributable to it;
- that it was received legally from a third party;
- that it was already in its possession prior to the execution of the Agreement;
- that it was developed independently and in good faith by its members of staff who did not have access to said Confidential Information.

Moreover, these provisions may not preclude:

- either the obligation binding on all personnel involved in the Program to provide an activity report to its institution, such communication does not represent disclosure within the meaning of intellectual property legislation;
- or the defense of the thesis related to the Program of this Agreement, with such defense being organized whenever necessary so as to guarantee, in compliance with effective university regulations, the confidentiality of certain results of the works carried-out pursuant to the Program.

Article 13 - Results

13.1. Ownership of results

The results, whether patentable or not, hereinafter referred to as the “Results”, which are obtained pursuant to the present Agreement are the equal property of the Parties, hereinafter referred to as the “Joint Owners”.

Each Joint Owner retains ownership of the knowledge acquired by it outside this collaboration. Each Joint Owner is entitled to use, free-of-charge, the Results for the sole purposes of its research and for research collaboration with third parties, to the exclusion of any and all other direct and/or indirect use for commercial purposes.

13.2. Appointment of an Administrator for the protection and exploitation of the Results

The Joint Owners designate among them an Administrator Institution (hereinafter referred as to "Administrator") to be in charge of the protection and the exploitation of the results, taking into account the expertises, the relevance of the intellectual property portfolio already owned by each Joint Owner.

Nevertheless, for each Result jointly owned by the French public Parties, possibly with other Parties, a French Party (hereinafter referred as to the "Mandatory") is designated in accordance with the French law. The Mandatory represents the French public Parties Joint Owners.

13.3. Protection of the Results by patent

Patent applications are filed in the joint name of the Joint Owners; the name of the inventor(s) shall be mentioned.

The Administrator has an express mandate from the other Joint Owners so as to manage the filing of patent applications and for obtaining and maintaining the resulting patents.

The Administrator assumes responsibility for steering and monitoring the priority filing procedures; It shall keep the other Joint Owners, represented by the Mandatory Institution when appropriate, informed of the progress of the application and provides the list of foreign countries in which extensions shall be filed.

Should one of the Joint Owners waive entitlement to file or maintain a patent and/or part of the extensions effective, it shall advise the other Joint Owners, represented by the Mandatory when appropriate, thereof within a reasonable timeframe so that they may continue the procedure.

In addition, the waiving Joint Owner undertakes to sign or get signed all documents enabling the other Joint Owners to become sole owners of the said patent(s); the Joint Owners which continue with the procedure in their own names shall be the sole beneficiaries of any income generated by use of the patent in the countries for which the other Joint Owner waived entitlement to continue with the procedure.

The expenses relating to filing, the issuing procedure, keeping effective and extending patents shall be equally shared between the Joint Owners, the Mandatory assuming the responsibility of the cost of the share of the French public institution involved in the LIA.

13-4. Legal proceedings relating to patents

All Joint Owners shall inform each other of any action for infringement by a third party against the Results, a declaration of invalidity, a claim or infringement of the Results by a third party.

All Joint Owners shall act together to jointly agree on the strategy to adopt and shall supply each other with all the evidence in their possession permitting an evaluation of the nature of the dispute.

In the case, it would not be possible to obtain a consensus, each of the Joint Owner may on its own and at its own expense take the actions which appear to it appropriate. It is understood that in this event, any compensation resulting from such actions ordered by the court shall wholly and irrevocably be the property of the Joint Owner acting.

13-5. Exploitation of the Results

The Administrator receives an express mandate from the other Joint Owners, to carry-out all exploitation-related work. In particular, it negotiates contracts on behalf of the Joint Owners with all companies wishing to exploit the Results.

The Administrator shall keep the other Joint Owners, regularly informed of the results of the negotiations. Any licensing agreement shall be signed by all the Joint Owners.

The Administrator shall repay to the Joint Owners represented by the Mandatory, when appropriate a proportion of the royalties resulting from the exploitation of the Result(s), less a contribution to the exploitation expenses of the Administrator representing a maximum of 20% of said royalties.

13-6. Software and databases

Each Party remains sole owner of the software and databases obtained by it outside the framework of the LIA.

The software and its extensions, and the databases, which are obtained in common are the joint property of the Parties having contributed to such obtaining.

The Parties have a free and non-assignable right-of-use over this software and databases for the Program requirements. For databases, the right-of-use relates to both the structure and content and includes an extraction right.

In the event of the granting of rights-of-use to third parties over the software and databases obtained in the framework of the LIA, the royalties received in this respect shall be shared equally between the Parties by the Administrator.

CHAPTER V – MISCELLANEOUS PROVISIONS

Article 14 – Renewal – Assessment

The Agreement may be renewed once, by written amendment.

At any time, the Parties may agree to form an ad hoc committee, in particular, in the event of the renewal of the LIA, in order to assess the LIA's activities and to make recommendations to its Program.

Article 15 – Adhesion, termination, withdrawal and exclusion

15.1. Adhesion

The Steering Committee may accept new laboratories from the Parties in the LIA.

The adhesion of new Parties to the LIA requires the signing of an adhesion amendment to the Agreement and becomes effective on the date of such signature. Subject to a unanimous decision from the Steering Committee concerning the adhesion application, the Parties grant a mandate to the CNRS to sign the adhesion amendment in the name of all the signatory Parties of the Agreement.

All the Parties shall be informed of any new adhesion application (Laboratory or Party).

15.2. Termination

In the event of an unresolved dispute, the Parties may decide by joint agreement to terminate the Agreement before its term, upon six (6) months 'written notice.

15.3. Withdrawal

Any Party may withdraw from the LIA with six (6) months' notice given by registered letter with acknowledgement of receipt. The Steering Committee shall approve the financial conditions of the withdrawal.

15.4. Exclusion

In the event of insufficient involvement in achieving the targets of the LIA or a Party's breach of its obligations, a Party may be excluded from the LIA by a unanimous decision of the Steering Committee; the concerned Party does not take part to the vote.

Article 16 – Liability

Each Party remains liable, without right of action against the other Parties, with the exception of cases of gross or intentional negligence, for repairing damage to its own property owing to, during the performance of this Agreement.

Should damage be caused to physical assets acquired by the Parties under this Agreement, the latter shall pay the repair or replacement charges for said assets on a pro rata basis of their respective financial contributions to the acquisition thereof.

According to the rules of ordinary law, each Party is liable for damage / loss of any nature caused to third parties during the performance of this Agreement.

Article 17 – Final provisions

The provisions of Chapter IV shall survive notwithstanding the expiry or termination of the Agreement or the withdrawal or exclusion of one of the Parties involved in this collaboration.

All research activities conducted in connection with the LIA shall be done in compliance with all the applicable laws, regulations, and guidelines of the countries and institutions in which the research is conducted.

The Parties shall endeavour to settle their differences out of court in an amicable way.

Should they fail to do so, any disputes may be settled in accordance with the rules of conciliation and the arbitration of the International Chamber of Commerce, under the aegis of one or more arbitrators appointed pursuant to these rules.

This Agreement is executed in English in eighteen (18) original copies.

In

On

For the **CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE**

The CNRS acting by power of attorney on behalf of the :

- U. St-Etienne
- IPGP

Antoine PETIT

The Chairman and CEO

In

On

For the **UNIVERSITÉ PARIS DIDEROT – PARIS 7**

Catherine CLERICI
The President

In

On

For the **ÉCOLE NORMALE SUPÉRIEURE DE PARIS**

Marc MEZARD

The Director

In

On

For the **UNIVERSITE RENNES 1**

David ALIS

The President

In

On

For the **ÉCOLE NORMALE SUPÉRIEURE DE LYON**

Jean-François PINTON
The President

In

On

For the **UNIVERSITÉ CLAUDE BERNARD LYON 1**

Frédéric FLEURY

The President

In

On

For the **UNIVERSITÉ JEAN MOULIN LYON 3**

Jacques COMBY
The President

In

On

For the **UNIVERSITÉ LUMIÈRE LYON 2**

Nathalie DOMPNIER

The President

In

On

For the **ÉCOLE NATIONALE DES TRAVAUX PUBLICS DE L'ÉTAT**

Jean-Baptiste LESORT

The President

In

On

For the **ÉCOLE NATIONALE SUPÉRIEURE D'ARCHITECTURE DE LYON**

Nathalie MEZUREUX

The Director

In

On

For the **INSTITUT NATIONAL DES SCIENCES APPLIQUÉES DE LYON**

Eric MAURINCOMME
The Director

In

On

For the **XINJIANG INSTITUTE OF ECOLOGY AND GEOGRAPHY OF THE CHINESE
ACADEMY OF SCIENCES**

CHEN Xi
The Director

In

On

For the **PEKING UNIVERSITY**

LIN Jianhua
The President

In

On

For the **TIANJIN UNIVERSITY**

LI Jiajun
The President

In

On

For the **INSTITUTE OF GEOLOGY OF THE CHINA EARTHQUAKE ADMINISTRATION**

CHEN Jianmin
The President

ANNEX 1- Scientific Program

1. Challenges and stakes

The main objective of the research carried out by the LIA-SALADYN is to quantify physical and chemical processes controlling the evolution of landscape over a wide range of time-scales, from the short time-scales associated with extreme events (earthquakes, floods, dust storms) to the geological time-scale. In a context of climate change, our goal offers the prospect of surmounting arguably the most enduring challenge for geosciences, which is the sustainable development of human society within a dynamic natural environment. Our research focuses primarily on active tectonics, erosion, weathering and sediment transport, which are the primary drivers of landscape dynamics. These different components are associated with specific physico-chemical processes but they all require a general understanding of the coupling between topography and climate conditions (e.g., wind and precipitation patterns), which together control surface flow and the sediment transport pathways. In addition, we also need to address issues like the interaction between vegetation and topography as it has been known for a long time that river morphology or weathering processes are strongly depending on ecosystem dynamics.

The western provinces of China in Central Asia provide a wide range of geomorphological and geological features for this cooperative effort. Active mountain ranges surrounded by deserts provide a variety of natural systems to document and study landscape dynamics at different length scales and under different boundary conditions. All these observations provide unique information, which can then be compared to the prediction of analytical, numerical and experimental models where individual physical and chemical can be tested. Furthermore, because of rapid development and extensive exploitation of natural resources, the major environmental units of western China are also subject to strong human pressure and are highly responsive to global change. Water balance, temperature changes, wind dynamics and air turbulence may have dramatic effects on river flow, vegetation growth, soil moisture, soil resistance to erosion, and the grain-size distribution of surface sediment. All these surface properties will, in turn, modify the rate of landscape evolution and strongly affect hydrological characteristics of stream and subsurface flows. These feedback mechanisms represent key targets for the understanding of the non linear interactions between global warming, landscape evolution and environmental preservation.

Within this general framework, we would like to address specific key targets that concern two complementary and interlaced landscapes: desert landscapes on one side, alluvial landscapes on the other. Mainly controlled by the deformation rates along major active faults in central Asia, these landscapes are the target of basic research operations that may have strong outcomes, especially for environment conservation and resources management in fragile and endangered settings. Water resources in arid desert come from the surrounding mountains drained by alluvial streams. These river systems transport sediment eroded from the cold and high mountains to basins of central Asia. These materials constitute an essential component of desert landscape.

We hereafter describe in more detail the specific research themes defined above. These themes have been the subject of intense research in the past and are regularly discussed by faculties from both institutions. As shall be seen, all these studies rely on strong cooperative efforts between scientists from diverse fields of expertise. This list should not be seen as a closed set of objectives. As shown by the recent incorporation of seismotectonics groups, it is more intended to act as a catalyst for our cooperative effort and as a privileged channel of communication for research activity. As a community, one of the goals of the LIA-SALADYN is indeed to gradually attract experts from France and China to continue to develop a coordinated and well-defined research strategy in landscape dynamics.

2. Active tectonics

Seismic landscapes

Most of the landscapes in western China are, directly or indirectly, the products of ductile and brittle deformation along major faults. While there is a considerable evidence for the repetition of large earthquakes on localized fault plane, the overall contribution of seismicity to landscape remains to be determined (*Meunier et al. 2008; Marc et al., 2016*), especially because of the balance between the processes that build topography (coseismic deformation) and the consecutive surface processes (landslides). From the time-scales of aftershock sequences (< 10 yrs) or averaged over long time (i.e., few seismic cycles), the interactions between seismic ruptures, landscape dynamics and sediment transport involve positive and negative feedback mechanisms that require a combination of specific studies in geomorphology (mapping fault ruptures, slope instabilities), seismology (wave propagation, local site effect) and hydrology (river dynamics, sediment transport). All these studies can be blended with the technological and human resources available in the LIA-SALADYN using the active mountain belts of western China as unique natural settings.

Seismic cycle and slip rates along active faults

Crustal faults accommodate slip either by a succession of earthquakes or continuous slip and, in some instances, both these seismic and aseismic processes coexist. Seismicity and geodetic measurements are therefore two complementary datasets that together document ongoing deformation along active tectonic structures (*Klinger et al. 2005; Xu et al., 2009*). Using geomorphic and sediment structures across and along major faults, paleoseismology offers the unique opportunity to document past seismic ruptures over few seismic cycles (*Klinger et al., 2011*). This is particularly the case in western China thanks to both the arid climate and the size of the largest earthquakes occurring in this region ($M \approx 8$). Then, an objective is here to continue to estimate the recurrence time and the characteristic size of the earthquakes that occurred in the past along major Tibetan faults (e.g., Altyn Tagh, Haiyuan and Kunlun faults). Geodetic measurements can also be used to assess inter-seismic deformation along the same faults. All together, these new constraints on the seismic history of these major Tibetan faults could lead to a better characterization of the seismic cycle and could be a clue to understand potential discrepancy between mid-term and short-term deformation rates.

3. Mountainous landscapes in a changing climate

Hydrologic balance and Ecological functioning

An important issue in Central Asia is to understand the links between upstream mountainous catchments and downstream alluvial fans and deserts (*Ding et al., 2007; Gao et al., 2010; Han et al., 2004; Niu et al., 2010*). This is especially important in the frame of a global warming scheme where the water resources are strongly dependant on the hydrologic budget in high mountain ranges. Upstream in the mountainous catchments glaciers are still present and the river bed may have a permafrost layer. This permafrost layer is interesting because it has a comparable influence on sediment transport and morphology as riparian vegetation. It impacts both the bank and bed strength, the thickness of the mobile layer, the groundwater flow and the hydrologic balance. In addition, the presence of vegetation may have a strong influence on the flow and river morphologies. It is therefore important to have a sound knowledge of both the hydrologic cycle and the ecology of river systems in order to make a correct assessment of sediment transport and landscape evolution (*Bornette and Puijalon, 2011; Corenblit et al., 2011*)

River metamorphosis and environmental change

We have recently discovered that river metamorphosis took place in the geologically active Tianshan mountain range, in the Bayinbuluke grassland. Located at an average elevation of about a 2500 m, this natural reserve is fed by glacial melt and summer precipitation. The landscape comprises frozen soils, alluvial fans at the toe of glaciers and mountain fronts that all feed marshy grasslands. At the transition between alluvial fans and grasslands, the initially braided out-wash rivers metamorphose into highly meandering rivers within less than a few hundred meters downstream. It therefore stands as a place, probably unique in the world, where the following three research topics can be addressed in a highly effective and complementary way by the different teams involved (*Métivier et al. 2016*). We wish to study metamorphosis of alluvial river plan form in mountainous regions, its dynamics and its relationship with the water balance. In some very rare places, it is possible to observe a radical change in river plan form from a multiple thread braided pattern to a single thread meandering pattern. The reasons for such a change remain largely unknown although this has potentially high implications for our understanding of river dynamics and river management (*Métivier and Barrier, 2012, Métivier et al. 2016, 2017*). In mountainous regions the influence of the water balance and of the frozen layer of soil may play a key role. This frozen layer may setup the characteristic scale over which active sediment transport takes place. It may also control the development of soil and the cohesion of river banks.

4. Alluvial landscapes in arid lands

Sediment transport and river morphodynamics

In arid and semi-arid regions, landscape evolution relies on erosion and mass transport by both wind and water. In these environments mass budgets are poorly known and the dynamics of erosion and sediment transport is poorly constrained because of a lack of suitable databases. Most rivers flowing in arid settings present typical features such as braiding, a large grain size distribution, non armoured and patchy beds (*Métivier et al., 2004; Guerit et al., 2014*). The hydrographs are seasonally marked with high summer flow resulting from glacial melting and orographic precipitations. Extreme events associated with flash floods may also occur (*Reid et al., 1998*). These conditions differ significantly from the conditions under which our common knowledge of sediment transport is built and it has been shown that arid rivers whether perennial or ephemeral may behave very differently from their temperate well vegetated counterparts (*Cohen and Laronne, 2005; Laronne and Reid, 1993; Laronne and Shlomi, 2007*). In order to understand why arid streams behave in a singular manner we need to characterize the peculiar river morphology and survey both sediment transport and shear stress distributions. Bedload transport is highly episodic and spatially variable, but an essential part of alluvial landscape evolution. Considering the grain size distribution documented in the field, it has now to be considered as a main ingredient in analytical and numerical models.

Hydrology and solid transport are essential components of landscape dynamics but it has also been shown that the ecology of alluvial rivers plays a significant role. Riparian vegetation exerts a significant influence on soil hence bank and bed strength. It also controls the depth to which sediment can be remobilized by water flow. Finally, vegetation strongly interacts with ground water flows (*Bornette and Puijalon, 2011*). All these issues may turn out to be of primary importance for the understanding of river dynamics and in particular river channel stability (*Métivier and Barrier, 2012*).

Sediment storage and quantitative environmental evolution

Floodplains and storage zones of alluvial rivers (e.g., alluvial fans) can be seen as a quantitative record of the evolution of past environments due to global change (*Métivier and Gaudemer, 1997; Poisson and Avouac, 2004; Reitz et al., 2010, Guerit et al., 2016*). Modern desert whether in cold or arid regions are places of sediment storage and preservation. If we prove to be able to relate the structure of the sedimentary deposits to quantitative parameters, such as discharge at the time of deposition, we may use

the sediment deposit as a quantitative record of past conditions. The study of sediment storage includes the analysis of alluvial fan growth dynamics and the mechanics of sediment transport and deposition. As such, this research shall be addressed through microscale physical experiments of fan building (*Guerit et al., 2014; Delorme et al., 2017*), field analysis (bed load and suspended load dynamics, stratigraphy, grain size distribution and transport, hydrology, surface dating), and numerical modeling. This research theme concerns both cold mountainous regions (e.g., the Bayinbuluke area) or more arid piedmonts (e.g., the Tianshan piedmont) that have been studied by our group over the last 10 years.

5. Aeolian geomorphology

Dune growth and pattern formation

Dunes are among the most complex but well-organized landscapes on Earth. Shaped by the wind, their morphologies depend locally on the basal shear stress imposed by the flow, sand availability, and the presence of vegetation. Because of the importance of the societal issues related to these superficial and highly mobile sedimentary layers, dune fields have been the focus of many research efforts since the middle of the XXth century. Dunes are usually studied by geographers at the length-scales of sand seas (<10 km) or by physicist at the length-scale of sediment transport (~1 m). In this project, we would like to couple numerical modelling with landscape-scale experiments (~100 m) to improve our understanding on dune dynamics. First, the idea was to quantify and model dune orientation under multidirectional wind regimes using an ongoing outdoor field scale experiment conducted by the Desert Laboratory of the CAREERI in the Tengger Desert (*Ping et al., 2014*). In this leading experiment, a dune field was completely flattened in 2004, and over the last 7 years, systematic high frequency atmospheric measurements (one measure every minute) have been coupled with bi-annual topographic mapping. This unique dataset has been used and compared to numerical models to directly estimate the evolution of dune orientation according to the seasonal winds (*Ping et al., 2014*). Second, as this experiment is continuing, we also hope that we will be able to describe the instability that generates primary and secondary dune patterns. The main challenge is actually to observe on the same site the coexistence of two dune growth mechanisms recently predicted by the theory (*Courrech du Pont, 2014*). Then, we hope that we can discuss the formation of reticulate dunes in the Tengger Desert.

The role of cohesion and aeolian erosion in extreme environments

Because of wind variability and the properties of granular media, aeolian sediment transport are characterized by highly nonlinear behaviours, so that it is still impossible to accurately determine the air flow from the shape and the orientation of geomorphic features such as dunes or yardangs. To provide new constraints on the formation of these aeolian landscapes, we propose to study sediment transport in presence of topographic obstacles (*Lucas et al., 2015*) or by varying the cohesion of the granular medium. Using observation, laboratory experiments and numerical models, we hope to determine more accurately the relative orientation of the winds where they cannot be accurately measured. It has important implications for mountainous environment on Earth but also for the inverse problem consisting in evaluating climatic conditions of other planetary bodies from the shape of the dunes (*Lucas et al., 2014; Fernandez-Cascales et al., under review*). For example, to test the effect of cohesion, we can use typical linear dunes around the Qaidam Basin, North of the Qinghai-Tibetan Plateau and compare them with similar linear dunes observed on Mars. This is the reason why different sites have been instrumented to regularly measure winds (every minutes) and topography (every 6 months). Similarly, field experiments in China can be developed at different places along a transect that encompass the largest possible range of elevation on Earth (from below sea level in the Turpan Depression up to 3000 m in the Qaidam basin near Geermu and 5000 m on the high Tibet Plateau). Thus, it is possible to study dune dynamics and aeolian erosion for different pressure conditions, from high to low, in order to extend these observations to Martian atmospheric conditions.

Long term evolution of dune fields and sand seas

Dunes fields are typical examples of self-organization within complex systems. Using numerical models and direct field measurement, we would like to analyse different population of dunes including barchans, transverse, linear, and star dunes (*Zhang et al, 2010; Zhang et al. 2012*). Then, we can investigate the stability of dune-size distributions and discuss the temporal evolution of dune fields over short and long time scales. Statistical studies of dune patterns in sand seas require new numerical tools for a real-time estimation of individual dune properties (length, width, height, spacing, volume, velocity etc.). Using these quantitative results, an objective of this part of the project is to understand how dune fields evolve with respect to change in flow strength and wind orientation (i.e. climate change). In addition, the evolution of the morphology of dunes (and dune fields) may be addressed quantitatively from wind data. For example, this have been done to understand the origin of raked linear dunes, elongated dunes that keep a constant orientation for considerable distances with a marked asymmetry between a periodic pattern of semi-crescentic structures on one side and a continuous slope on the other (*Lü et al., 2017*). Similar studies can be conducted in all Chinese sand seas to derive from dune shape precious information about the local wind regimes.

6. Chemical potamology

Weathering, mass budgets and Global Cycles

Mass budgets and especially the contribution of chemical weathering is poorly known in arid settings (*Goudie, 1995*). The importance of silicate weathering in the denudation budgets, the relative importance of chemical versus mechanical weathering have long been and still remain a matter of discussion mainly because of the relative paucity of available data in Arid settings. Furthermore weathering, erosion of biomass and carbon storage act as sink for carbon dioxide on geologic times scales (*Gaillardet et al., 1999; Millot et al., 2002*). As most of the weathering products or erosion in central Asia do not reach the East China Sea, it is important to understand the potential role of weathering of silicates and carbonates both in landscape evolution and hydrologic cycle at geological time scales

At a larger scale it is important to be able to understand sediment transport pathways, residence times, chemical reactions in floodplains and their relationships with the geologic and climatic setting. The Yellow river for example along its course in the regions of Qinghai, Gansu, Nigxia and Shanxi successively interacts with glaciers, actively rising mountain ranges, loess plateaux and dune fields. It is probably the only large river that encounters so many diverse and extreme environments. Its morphology, course and deposits record much of the history of the region.

Water resources

Many of the key challenges facing France, China and the global society in general (e.g., increasing pressures on water resources and energy, pollutant migration, removal off pollutants and remediation of damages caused by them) require special attention to processes in river ecosystems. This cannot be done without detailed examination of the roles and fluxes of organic matter that constitutes that largest pool of organic carbon in our planet. Its concentration, composition, and chemistry are highly variable and depend on not only the nature of the watershed, but also on the temperature, ionic strength, pH, major cation composition of the water. Essentially, organic matter is a DNA of any environmental system that helps us understand the processes critical for any river and/or watershed. On the other hand, organic matter is a fundamentally important component in rivers as its presence causes aesthetic concerns such as color, taste, and odor. organic matter also produces toxic and carcinogenic disinfection byproducts and affects the mobility and concentrations of heavy metals in drinking waters. Our project aims at a better understanding of the chemical

*reactivity and properties of **organic matter** in rivers of major regional or global importance (notably, the Seine and Yangtze rivers).*

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ANNEX 2 - Consolidated projected budget as of January 1st, 2017

Country	Institution	In-cash funding		Amount (€) <i>(include detailed budget allocation if known)</i>	In-kind input <i>(if applicable)</i>	Type of staff	Full-time equivalent
France	CNRS	<input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Equipment <input checked="" type="checkbox"/> Mobility	<input type="checkbox"/> Other <i>(specify)</i> _____ _____ _____	7.500		<input type="checkbox"/> Researcher <input type="checkbox"/> Postdoc <input type="checkbox"/> PhD <input type="checkbox"/> Support	
	UPD	<input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Equipment <input checked="" type="checkbox"/> Mobility	<input type="checkbox"/> Other <i>(specify)</i> _____ _____ _____	2.000		<input type="checkbox"/> Researcher <input type="checkbox"/> Postdoc <input type="checkbox"/> PhD <input type="checkbox"/> Support	
	IPGP	<input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Equipment <input checked="" type="checkbox"/> Mobility	<input type="checkbox"/> Other <i>(specify)</i> _____ _____ _____	2.000	5 months fellowship (20.000€)	<input type="checkbox"/> Researcher <input type="checkbox"/> Postdoc <input type="checkbox"/> PhD <input type="checkbox"/> Support	
	UCBL	<input type="checkbox"/> Operations <input type="checkbox"/> Equipment <input type="checkbox"/> Mobility	<input type="checkbox"/> Other <i>(specify)</i> _____ _____ _____			<input checked="" type="checkbox"/> Researcher <input type="checkbox"/> Postdoc <input type="checkbox"/> PhD <input type="checkbox"/> Support	0.4 ETP
China	XIEG	<input checked="" type="checkbox"/> Operations <input checked="" type="checkbox"/> Equipment <input checked="" type="checkbox"/> Mobility	<input type="checkbox"/> Other <i>(specify)</i> _____ _____ _____	50000 yuan (~6000 euros)		<input type="checkbox"/> Researcher <input type="checkbox"/> Postdoc <input type="checkbox"/> PhD <input type="checkbox"/> Support	

ANNEX 3 - Composition of the LIA as of January 1st, 2017

COUNTRY	SIGNATORY Institution	UNITY / TEAM	STAFF	GRADE	Time devoted to the LIA %
FRANCE	CNRS/IPGP/UPD	IPGP	Laurie Barrier	Asst Pr.	20
			Marc Benedetti	Professor	10
			Olivier Devauchelle	Junior Res.	10
			Jérôme Gaillardet	Professor	10
			Eric Gayer	Assistant Pr.	20
			Eric Lajeunesse	Senior Res.	10
			François Métivier	Professor	50
			Clément Narteau	Asst Prof.	20
			Yann Klinger	Senior Res.	20
			Sébastien Rodriguez	Assistant Pr.	20
	CNRS/UPD	MSC	S. Courrech du Pont	Asst. Pr.	10
	CNRS/ENS	LG-ENS	Patrick Meunier	Assistant Pr.	20
	CNRS/UCBL/ENS Lyon	LGL-TPE	Pascal Allemand	Pr.	10
			Cathy Quantin	Asst. Pr.	10
			Vincent Langlois	Asst. Pr.	10
			Gweltaz Maheo	Asst. Pr.	10
			Ph. Hervé Leloup	Senior Res.	10
	CNRS/Rennes 1	Géosciences Rennes	Sylvie Bourquin	Senior Res.	10
			Alain Crave	Junior Res.	10
			Philippe Davy	Senior Res.	10
			Marc Jolivet	Senior Res.	25
			Dimitri Lague	Senior Res.	10
			Cécile Robin	Asst. Pr.	10
			J. Van De Driessche	Pr.	10
			Olivier Dauteuil	Senior Res.	10
	CNRS/ENS Lyon/ UCLB/U.Lyon 3/U.Lyon 2/MINES Saint-Étienne/INSA Lyon/ENSA Lyon/ U. St-Etienne/ ENTPE	EVS	Hervé Piégay	DR	10
			Yanni Gunnell	PR	10

CHINA	CAS / XIEG	Key Laboratory of Oasis Ecology and Desert Environment	Yaning Chen	Prof.	10
			WeiHong LI	Prof.	10
			Chen Yapeng	Associate Pr.	10
			Xingming Hao	Associate Pr.	10
			Zhaoxia Ye	Associate Pr.	10
		Bayanbulak research station for alpine steppe ecosystems	Yukun Hu	Professor	10
			Adeli Madey	Associate Pr.	10
			Anwar Mohammat	Associate Pr.	10
	IGCEA	Institute of Geology	Xiwei XU	Prof. Deputy director	30
			Guihua CHEN	Researcher	30
			Jing LIU	Pr.	30
			Huiping ZHANG	Researcher	20
			Jinyu ZHANG	Researcher	20
			Ping WANG	Researcher	20
			Heng WANG	Researcher	20
	PKU	College of Environmental Sciences and Engineering	Mingquan Yan	Associate Pr.	20
			Zhengshan Li	Pr.	10
			Juan Liu	Assistant Pr.	10
		School of Earth and Space Science	Zhaojie Guo	Prof.	10
			Yuanyuan Zhang	Assistant Prof.	10
			Jinjiang Zhang	Prof.	10
	TJU	Institute of Surface - Earth System Science (ISESS)	Siliang Li	Pr.	10
			Yunchao Lang	Pr.	10
			Yanping Xu	Pr.	10
			Benjamin Chetelat	Pr.	10
			Xiaodong Li	Pr.	10
			Xueyan Liu	Pr.	10
			Ruoyu Sun	Assistant Prof.	10